

CLAIMS

1. A heat exchanger for exchanging heat between a first fluid
2 and a second fluid, comprising:
a plurality of stacked plates, including a cover plate on one side of the
4 stacked plates and a base plate on the other side of the stacked
plates, wherein
6 said plates are spaced from one another to define channels
therebetween,
8 each of said plates except said base plate include first, second,
third and fourth openings therethrough, said openings
10 being aligned to define first, second, third and fourth
passages through said stacked plates, said first and third
12 passages being input and output passages, respectively,
for said first fluid and said second and fourth passages
14 being input and output passages, respectively, for said
second fluid, and
16 said first fluid input and output passages communicate with a
first group of said defined channels and said second fluid
18 input and output passages communicating with a second
group of said defined channels, said channels of said first
20 group being alternately disposed between said channels
of said second group; and
22 a reinforcing body disposed in one of said first, second, third and fourth
passages, said reinforcing body being secured to said cover
24 plate and said base plate and spaced from the sides of the

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26 openings defining said one of said first, second, third and fourth
passages in said stacked plates between said cover and base
plates.

2 2. The heat exchanger of claim 1, wherein a fluid flow path is
defined between the reinforcing body and the aligned openings defining said
one passage.

2 3. The heat exchanger of claim 1, wherein said reinforcing
body is a substantially cylindrical rod and said one passage is substantially
round whereby fluid passes through an annular portion of said one passage
4 around said reinforcing body.

2 4. The heat exchanger of claim 1, wherein:
the opening of said cover plate defining said one passage has a collar
therearound defining a diameter smaller than the diameter of the
4 openings of the other plates defining said one passage,
said reinforcing member has a neck secured in said collar, and
6 fluid openings extend through said collar communicating with said one
passage.

2 5. The heat exchanger of claim 4, further comprising a
connector secured to said cover plate and adapted to connect with a fluid line
whereby fluid may flow between said fluid line and said one passage through
4 said fluid openings.

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6. The heat exchanger of claim 4, wherein said reinforcing member neck is soldered in said collar.

7. The heat exchanger of claim 4, wherein said collar is an integrally formed deformation of said cover plate.

8. The heat exchanger of claim 4, wherein said collar is a ring fixed to said cover plate.

9. The heat exchanger of claim 4, wherein:
a fluid flow path is defined between the reinforcing body and the aligned openings defining said one passage; and
said fluid flow path having a cross-sectional area substantially the same as the total cross-sectional area of said collar fluid openings.

10. The heat exchanger of claim 4, wherein said base plate includes a flange, and said reinforcing member is soldered to said base plate flange.

11. The heat exchanger of claim 10, wherein said flange is an integrally formed deformation of said base plate.

12. The heat exchanger of claim 1, wherein said first and second fluids are different.

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2 13. The heat exchanger of claim 12, wherein said first fluid is
CO₂ for vehicle air conditioner refrigerant and said second fluid is engine
coolant.

2 14. The heat exchanger of claim 1, wherein said plates have
a generally flat heat exchange surface generally surrounded by a beveled
edge, and said plates are stacked by nesting said plates with said beveled
4 edges together and said flat heat exchange surfaces spaced.

2 15. The heat exchanger of claim 14, wherein said beveled
edges of nested plates are soldered together.

2 16. The heat exchanger of claim 1, further comprising:
first spacing rings around said first and third passages blocking
communication of said first fluid input and output passages with
4 said second group of defined channels; and
second spacing rings around said second and fourth passages blocking
6 communication of said second fluid input and output passages
with said first group of defined channels.

2 17. The heat exchanger of claim 16, wherein said first spacing
rings are secured in the space between said plates defining said second group
of defined channels.

2 18. The heat exchanger of claim 1, wherein alternating plates
between said cover plate and said base plate have a thickness generally

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corresponding to the thickness of the cover and base plates, and said plates
4 between said alternating plates have a thickness less than said cover and base
plate thickness.

19. A heat exchanger for exchanging heat between a first fluid
2 and a second fluid, comprising:

a plurality of stacked plates, including a cover plate on one side of the
4 stacked plates and a base plate on the other side of the stacked
plates, wherein

6 said plates are spaced from one another to define channels
therebetween,

8 each of said plates except said base plate include first, second,
third and fourth openings therethrough, said openings
10 being aligned to define first, second, third and fourth
passages through said stacked plates, said first and third
12 passages being input and output passages, respectively,
for said first fluid and said second and fourth passages
14 being input and output passages, respectively, for said
second fluid, and

16 said first fluid input and output passages communicate with a
first group of said defined channels and said second fluid
18 input and output passages communicating with a second
group of said defined channels, said channels of said first
20 group being alternately disposed between said channels
of said second group;

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22 a first reinforcing body disposed in said first passage, said first
 reinforcing body being secured to said cover plate and said base
24 plate and spaced from the sides of the openings defining said
 first passage in said stacked plates between said cover and base
26 plates; and
 a second reinforcing body disposed in said third passage, said second
28 reinforcing body being secured to said cover plate and said base
 plate and spaced from the sides of the openings defining said
30 third passage in said stacked plates between said cover and
 base plates.

2 20. The heat exchanger of claim 19, wherein said plates are
 generally rectangular, and said first and third passages are disposed adjacent
 opposite corners of said plates.

2 21. The heat exchanger of claim 19, wherein said first fluid is
 CO₂ for vehicle air conditioner refrigerant and said second fluid is engine
 coolant.

2 22. The heat exchanger of claim 19, further comprising:
 a third reinforcing body disposed in said second passage, said third
 reinforcing body being secured to said cover plate and said base
4 plate and spaced from the sides of the openings defining said
 second passage in said stacked plates between said cover and
6 base plates; and

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8 a fourth reinforcing body disposed in said fourth passage, said fourth
reinforcing body being secured to said cover plate and said base
10 plate and spaced from the sides of the openings defining said
fourth passage in said stacked plates between said cover and
base plates.